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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/530,968	05/19/2000	JEAN-CLAUDE GROSSETIE	JEK/GROSSETI	6299
7590 10/24/2003				
BACON THOMAS 625 SLATERS LANE FOURTH FLOOR ALEXANDRIA, VA 22314		EXAMINER CHANG, AUDREY Y		
		ART UNIT 2872 PAPER NUMBER		

DATE MAILED: 10/24/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/530,968

Applicant(s)

GROSSETIE ET AL.

Examiner

Audrey Y. Chang

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 21 August 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-25 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-25 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_ 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Remark*

- This Office Action is in response to applicant's amendment filed on August 21, 2003, which has been entered as paper number 8.
- By this amendment, the applicant has amended claims 1, 2, 5, 9, 10, 12, 13, 14, 15, 17, 18, 21, 22 and 25. The applicant is respectfully reminded that some amendments of the claims are not in comply with the requirement of 37 CFR 1.121, wherein no markings to indicate the amendments are given.
- Claims 1-25 remain pending in this application.
- The rejections to claims 8, 10-13, 20 and 22-25 under 35 USC 112, first paragraph, set forth in the previous Office Action **still hold**.
- The rejections to claims 1-25 under 35 USC 112, second paragraph, set forth in the previous Office Action **still hold for the reasons stated below**.

### *Claim Rejections - 35 USC § 112*

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. **Claims 8, 10-13 and 20 and 22-25 are rejected under 35 U.S.C. 112, first paragraph**, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

*The reasons for rejection are set forth in the previous Office Action dated February 25, 2003.*

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The claims **STILL FAIL** to define the convolution product and **FAIL** to define what are the two components. Claim 8 **DID NOT** describes a convolution product and did not describe anything.

The specification also fails to teach how can the amplitude be determined as “determining amplitude values each depending on the square root of a corresponding value”, **recited in claim 18**. It is not clear what is this “amplitude value” and what is the “corresponding value”. If the amplitude value is referred to the computed hologram then it should be referred as the “square root of the amplitude transmittance of the sum (or interference) of the diffracted wave and the reference wave”.

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. **Claims 1-25 are rejected under 35 U.S.C. 112, second paragraph**, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

*The claims are generally narrative and indefinite, failing to conform with current U.S. practice. They appear to be a literal translation into English from a foreign document and are replete with grammatical and idiomatic errors.*

The phrase “simulating the production of a diffracted image resulting from the diffraction of an optical wave ...” recited in claims 5 and 17 are confusing, in error and not making any sense. It is not clear what is considered as a production of a diffracted image and it is also not clear how does the optical wave relate to complex image or any other image.

The phrase “said common digital image” recited in the **amended** claims 9 and 21 is indefinite and confusing since it is not clear what is considered to be the digital image here and it lacks proper antecedent basis from their respective based claims.

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The phrase "two components" recited in claims 8 and 20 are not defined which makes the scope of the claims unclear. The description of claims 8 and 20 is confusing and in error.

The *applicant* is respectfully reminded to clarify **ALL** of the *discrepancies* in the claims to make the claims in comply with the requirements of 35 USC 112, first and second paragraphs. The examiner can only point out a few; it is applicant's responsibility to correct all of the discrepancies.

***Claim Rejections - 35 USC § 102***

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. **Claims 1-4 and 14-16 are rejected under 35 U.S.C. 102(b) as being anticipated by the patent issued to Haines (PN. 4,969,700).**

Haines teaches a system and method for generating holograms from a *computer model* of any *object* (30, Figure 4) wherein the method comprises the step of *computing* a set of *two-dimensional images* (200 and 400) representing the *object* (30) from perspective *different viewpoints* (52 and 54) in a three-dimensional space, the step of *computing element holograms* (52 and 54) for the corresponding two-dimensional images wherein the element holograms are *combined* to form the hologram (50) of the object, (please see Figure 4 and columns 3-6). Haines teaches to use computer model for representing any object that are three dimensional in extend. This means the object is a *virtual* three-dimensional object.

The different perspective *viewpoints* (52 and 54) constitute a *matrix* of *points* in a first geometric plane (50) that is separate from the object. The set of two-dimensional images on a second plane is

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formed by the projection of the object as seen from the respective viewpoints (52 and 54) on the first geometrical plane.

Haines teaches that the element hologram for each of two-dimensional image is calculated using technique including Fourier transformation.

**Claims 1 and 14 have been amended** to include the feature "set of two dimensional images representing the object as seen from perspective different viewpoints in the three-dimensional geometrical space". Haines teaches specifically that image light rays along the paths (22 and 24, Figure 1) which creating the image points (such as 220 etc.) on the two dimensional images (200 and 400) will be **seen by the viewers** at 52 and 54, (please see column 4, lines 35-37). The viewpoints (52 and 54) therefore are the physical viewer positions and the image representations (200 and 400) are **real images** of the object seen by different viewer at 52 and 54. The image light rays (22 and 24) are generated by light beams from a light source (10) and diffused off the object as shown in Figures 1 and 4.

**Claim 2 has been amended** to include the features of having a first and second geometrical planes. Haines teaches that the holographic surface (50) serves as the first geometrical plane that is separated from the object (30) and having a matrix of observer positions or viewpoints (52 and 54). The light rays diffused from the object along the different observer viewpoints will form the projected images of the object on the plane that is mapped by the images (200 and 400).

*This reference has therefore anticipated the claims.*

***Claim Rejections - 35 USC § 103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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8. **Claims 5-13 and 17-25 are rejected under 35 U.S.C. 103(a)** as being unpatentable over the patent issued to **Haines** in view of the patent issued to **Saito et al** (PN. 5,668,648) and "Fourier transform computer-generated hologram: a variation on the off-axis principle" by **Michelin et al** (SPIE vol. 2176 1994/249).

The method and system for making computer generated hologram from a computer model of any object taught by *Haines* as described for claims 1 and 14 above has met all the limitations of the claims. *Haines* teaches that the element holograms correspond to the set of the two-dimensional images are obtained by calculating the amplitude and phase of the interference between the sample rays and reference ray using *Fourier* transformation. The amplitude obtained generally is complex amplitude, (please see column 5, lines 50-55).

This reference has met all the limitations of the claims with the exception that it does not *explicitly* teach the calculation steps recited in the claims for calculating the element holograms. **Saito et al** in the same field of endeavor teaches a computer-assisted holographic display apparatus that is comprised of a *diffraction image computation section* (12) for receiving an input image data signal that represents a three dimensional object (20) and to compute the corresponding diffraction pattern data with a first sampling density. The apparatus further comprises *second computation section* that is connected to the diffraction image computation section to subject the diffraction pattern data to the *interpolation process* (28) so as to created *interpolated diffraction pattern data* with a *second sampling density* that is *increased* (i.e. an oversampling process). A *third computation section* (30) is connected to the second section to compute the *interference pattern data* between the *interpolated* diffraction data pattern and a reference wave. The interference pattern data is obtained by using the multipliers (174, 176, Figure 8) and adder (178, Figure 8), which corresponds to the addition (or superposition) of the diffraction wave and reference wave. **Saito et al** teaches that Fourier transformation could be used in the computation process. **Saito** further teaches that the computer-generated holograms are displayed on a *spatial light*

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*modulator* (16, Figure 1) wherein light source may be used to physically reproduce the hologram image of the object. With regard to claims 12-13 and 24-25, light sources of different color can be used to reproduce holograms of different colors, (please see Figure 12). *Michelin et al* in the same field of endeavor also teaches the standard computation process for making Fourier-transform computer-generated hologram that includes using Fourier transformation to make the original planar image  $f$ , (i.e. a real function) to become a complex function. A complex field representing the reference wave then is added to the complex image function to compute the amplitude transmittance, (please see page 250). It would then have been obvious to one skilled in the art to apply the teachings of Saito and Michelin et al to modify the computer generated hologram of Haines to efficiently compute the element hologram information and to display the element holograms on a spatial light modulator such as liquid crystal display.

**Claim 6 has been amended** to include the feature "said amplitude value each depending on the square root of a corresponding intensity value taken by the real function of the given two-dimensional image". Such feature is implicitly included in the wave theory of the image light, wherein intensity of the image light wave is the absolute square of the amplitude value of the wave function.

### ***Double Patenting***

9. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).



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10. Claims 1-25 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-32 of U.S. Patent No. 6,344,909 in view of the patent issued to Haines (PN. 4,969,700).

The instant application and the cited patent teach exactly the same calculation process for producing hologram from two dimensional object images with the exception that the cited patent does not claim the procedure of obtaining the two-dimensional image data from a three dimensional object. However the steps for obtaining the set of two-dimensional images representing different viewpoints in three-dimensional space of an object is commonly known in the art as described in the prior art patent issued to Haines. Such difference therefore does not give a patentable distinction between the instant application and the cited patent (PN. 6,344,909).

***Response to Arguments***

11. Applicant's arguments filed on August 21, 2003 have been fully considered but they are not persuasive. The newly amended claims have been fully considered and they are rejected for the reasons stated above.

12. Applicant's arguments are mainly based on the amended features in the claims and they are fully addressed in the paragraphs above.

13. In response to applicant's arguments which state that the cited Haines reference does not teach a set of two-dimensional images representing the object as seen from perspective viewpoint in the geometrical space the examiner respectfully disagrees. Haines specifically teaches that the set of two-dimensional images (200 and 400) are representation the object as being seen by observer at positions 52 and 54. Haines further teaches that the two-dimensional images (200 and 400) are formed by *light rays* diffused from the object and focused to the observer viewpoints (52 and 54, please see Figures 1 and 4).

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The actual light rays (22 and 24) are generated by a light source (10) which means the images are **real** and **can be seen** by observers at the respective observation points (52 and 54).

*Conclusion*

14. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Audrey Y. Chang whose telephone number is 703-305-6208. The examiner can normally be reached on Monday-Friday (8:00-4:30), alternative Mondays off. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew Dunn can be reached on 703-305-0024. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

*Audrey Y. Chang*  
*Primary Examiner*  
*Art Unit 2872*

A. Chang, Ph.D.